

BECK[®]



**ELECTRONIC
CONTROL DRIVES
FOR THE PULP AND
PAPER INDUSTRY**



Improved process control is critical for today's papermaking requirements

The ever growing need to improve quality, improve efficiency and meet more stringent environmental regulations, emphasizes the importance of improved process control. Throughout the industry, pulp and paper mills are making large investments in state-of-the-art control systems in an effort to attain the level of control performance required for success in this highly competitive global market.

Beck's unique ability to provide quick, accurate and consistent positioning of final control elements allows mills to fully utilize the power of their control systems. This ability allows Beck drives to significantly decrease process variability, improve product quality and reduce operating costs.

The control benefits provided by Beck drives can be attributed to the unique design. Beck drives feature accurate, durable positioning electronics, along with a no-burnout motor and efficient spur gearing. This design enables the Beck drive to start and stop instantly—virtually eliminating dead time and overshoot regardless of load or process conditions.



Machine chest recirculation control valve



Stuffbox level control valve



Machine chest level control valve



Refiner pressure control valve

Beck rotary and linear drives for pulp and paper applications

Group 11 Rotary Valve Drives are available with external linkage or direct-coupled to quarter-turn ball, plug and butterfly valves.

Group 11 Damper Drives provide high-torque control of process dampers and are available with factory linkage kits for simple installation.

Direct-coupled **Group 14 Linear Valve Drives** are ideal for globe valves and other linear valve applications.

Compact **Group 31 Rotary Valve Drives** provide exceptional control of small ball and butterfly valves.

The relationship of the valve, control drive and mounting configuration is of critical importance in ensuring a successful installation. For this reason, Beck drives are available with valves, factory mounted and tested for simple drop-in installation, or with mounting hardware for field installation on your existing valves and dampers.

These fully integrated assemblies are pre-engineered to match the mechanical and electrical requirements of your system.



Vat level control valve



Stock flow control valve



Thick stock flow valve

Contact a Beck Sales Engineer at 215-968-4600 to find out more about the best drives for your installations. Visit our website at www.haroldbeck.com. E-mail: sales@haroldbeck.com

Beck control drives provide field-proven solutions to control problems

Control loop performance is only as good as the performance of the control valve. It is a well-documented fact that many industrial control loops function poorly as a result of valve actuation problems. Beck control drives eliminate the problems caused by both pneumatic and typical electric actuators, and maximize the potential of control systems.

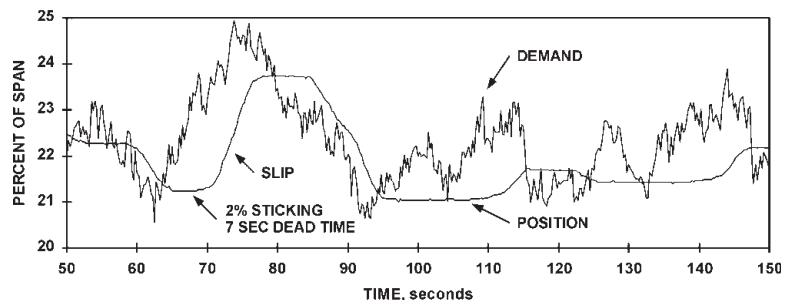
This is accomplished through the unique Beck design, which provides a number of key performance advantages including:

- Repeatable positioning down to 0.1% resolution
- Will not STICK, SLIP or OVER-SHOOT
- Instantaneous starts and stops
- No performance degradation over time or with changing loads
- No duty cycle limitations
- Rated from (-40) to 85°C. (185°F.)
- Requires little or no maintenance

Unlike pneumatic actuators, Beck drives provide consistent and precise performance over time regardless of changing process conditions.

Pneumatic actuators are subject to inherent characteristics that limit and disrupt control loop performance. Many recent developments in this technology center on advanced diagnostics to help detect and predict these problems, but the compressibility of air remains the major problem source. As such, the overall performance of pneumatic actuators varies as a function of frictional and dynamic load, process conditions, valve condition, and the performance of actuator accessories like the I/P transducers, positioners, and boosters. This results in inconsistent and often wide deadbands, poor resolution, sluggish response, and overshoot. Even when pneumatic actuators perform well when new, these problems become increasingly prevalent and unpredictable over time. Heat, humidity, contamination, and air quality all serve to increase performance degradation and inconsistency, often making excessive maintenance necessary to maintain acceptable control.

“Stick and slip” is one of the most common pneumatic actuator problems. This condition occurs when an actuator builds pressure to overcome a static load (usually frictional, but not always). As the pressure builds, the final control element does not respond, and therefore the controller continues to increase the demand. When the air pressure is high enough to initiate movement, the actuator takes off and overshoots the correct position. This can result in “limit cycling”—causing the controller to continuously cycle.

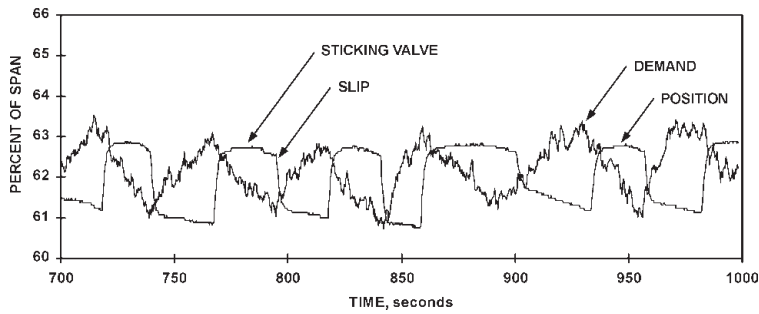


MACHINE CHEST CONSISTENCY CONTROL VALVE

Figure 1: This data is from a consistency control loop in a North American mill. It demonstrates the problem of stick and slip. As shown, a 2% change in demand was required to initiate response. In this case, the result was 7 seconds of dead time.

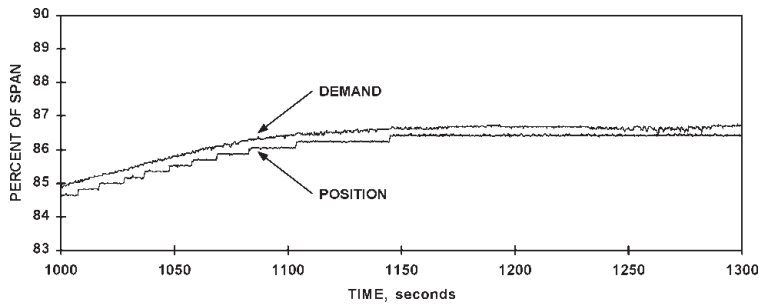
Typical electric actuators have problems of their own. Many designs incorporate high-speed induction motors that do not stop instantaneously and require a limited duty cycle to prevent overheating. In addition, most utilize inefficient worm gears, which can wear quickly, particularly within actuators installed in active loops. These problems dictate the use of wide deadbands, which can severely limit the resolution of a final control element. Another significant concern is the overall reliability of typical electric actuators. The electronics often cannot withstand harsh environmental conditions and cause costly control downtime.

Beck control drives are designed to eliminate the problems of both pneumatic and conventional electric actuators. Beck drives provide consistent and precise performance despite the effect of changing process conditions—without sticking, slipping or degrading over time.



STOCK-TO-KNOTTERS FLOW CONTROL VALVE

Figure 2A: In this stock-to-knotters flow control valve application, the pneumatically actuated valve exhibited a 2% limit cycle. The resulting cycle in the stock flow upset the knotter throughput, often causing plugging to occur. The cycle also destabilized upstream consistency control, which further contributed to knotter plugging.



KNOTTERS FEED PRESSURE CONTROL VALVE

Figure 2B: A Beck control drive, installed on the same valve, was able to closely track the controller output. This not only enabled the mill to tune the loop more appropriately, but aided in redesigning the control strategy to be more effective. Part of the redesign included eliminating the stock flow loop and converting to a pressure control valve. Unlike the pneumatic actuator, the Beck drive provides the resolution, consistency and instantaneous response necessitated by the fast dynamics of pressure control.

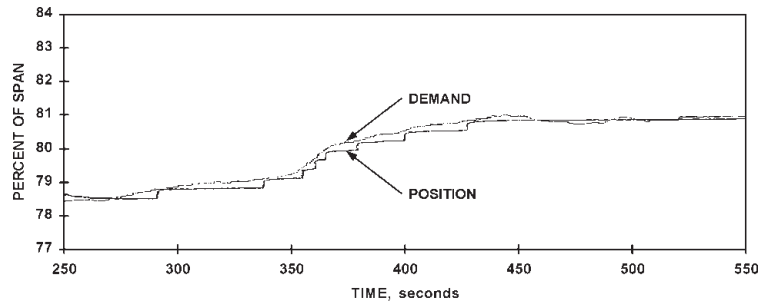
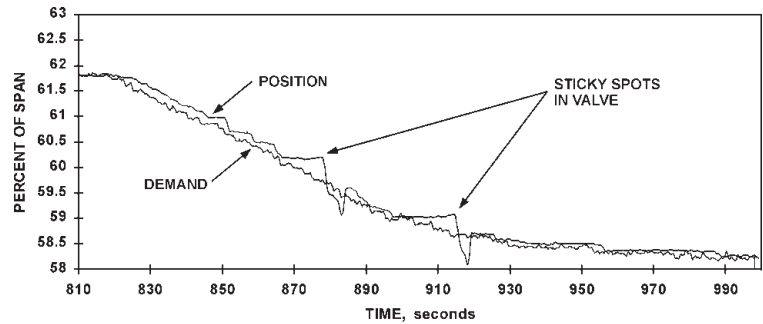


Figure 2C: Even after eight years of difficult service, the Beck drive performance is unchanged.

MACHINE CHEST CONSISTENCY CONTROL VALVE

Figure 3: In a thick stock dilution valve at another mill, this relatively new, pneumatically actuated valve performed adequately over much of its operating range. However, sticking occurred at approximately the 60% open position. This caused overshoot that affected the stock consistency. This subtle sticking problem is common and often develops quickly in new valves.

The mill installed a Beck drive to eliminate the problem. The instantaneous, full-torque starting capability of the Beck control drive ensures that if valve stiction is present, it will not affect positioning performance.



MACHINE CHEST STOCK CONSISTENCY

Figure 3A: This curve shows the negative impact the subtle stick problem (see Figure 3) had on stock consistency.

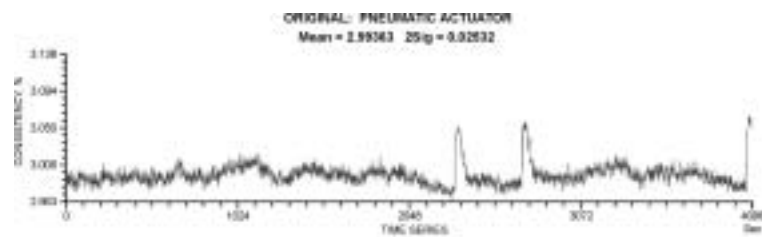


Figure 3B: By installing a Beck drive, the negative impact of the sticking problem was completely eliminated. In addition, the consistency meter was moved closer to the control valve reducing dead time. This, combined with the Beck drive, yielded an overall improvement in consistency control.



Exceptional control for predictable valve performance

The Beck electronic valve drive answers the demand for more accurate, reliable control of quarter-turn valves. The precision and reliability of the Beck design put an end to the problems and inefficiencies of pneumatic and conventional electric actuators.

The Group 11 and Group 31 designs incorporate a variety of unique features to ensure 100% availability, fast response to control signal commands, and dependable position control. These features will maximize the efficiency of control systems while virtually eliminating the labor needed for maintenance and calibration.

Digital electronics ensure repeatable position control, simple operation, and diagnostic capabilities

Beck control drives are equipped with field-proven electronics that provide excellent valve position control in response to modulating control signals. This maximizes control loop performance by ensuring that the valve responds exactly as the control loop requires.

The Beck Digital Control Module (DCM), which resides within the drive, provides unparalleled position control. The DCM also makes calibration and configuration changes a simple push-button operation, while providing advanced features such as stall protection. An optional HART® interface adds even more flexibility as well as important diagnostic capabilities.

Beck's Contactless Position Sensor (CPS) also resides within the drive, and provides reliable internal position feedback to the DCM for position control. The DCM also uses the sensor signal to source a 4–20 mA feedback signal for continuous remote monitoring of the drive position.



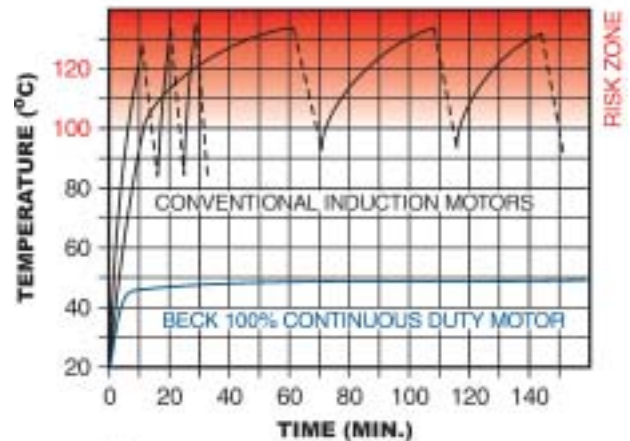
Proven control motor and gearing deliver decades of trouble-free performance

The Beck control motor, unlike conventional motors, does not overheat or burnout; it stays cool under continuous modulation to provide 100% availability and reliable response to control signal input.

Tested in an active modulating control loop, conventional motors increased rapidly in temperature, tripping overload devices and making them unavailable for extended time intervals. Only the Beck control motor remained available for continuous operation.

The motor transmits torque directly and efficiently through a drive train consisting of precision gears of alloy steel and ductile iron. The result is a powerful drive unit that works hand-in-hand with your electronic control system, responding to input signals instantly without coasting and without overshooting.

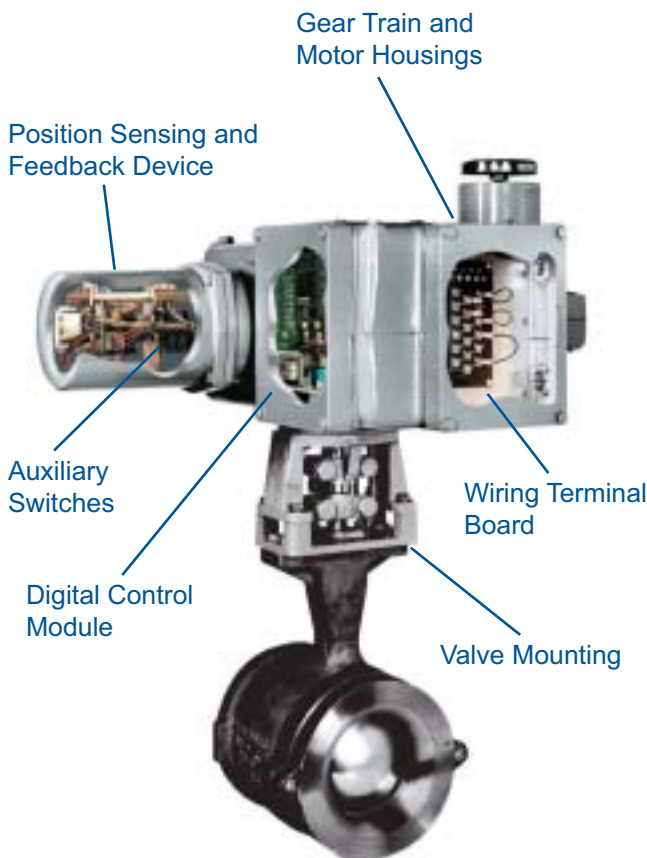
Rise in Motor Operating Temperatures
100% Modulating Duty Cycle



⏏ = Time elapsed between auto shut-off and restart.

Individual cast covers protect components from severe dirt, water and weather conditions

Beck drives are well suited to abusive environments because of the extra measure of protection provided by their rigid, gasketed housing covers. Separate compartments protect the major components from dirt and moisture. Each of these compartments may be accessed without exposing other components to the environment. In addition, the drive can be mounted in any orientation.



Consistent performance with very low maintenance

The Beck drive is designed for low maintenance operation over the life of the drive.

The electronics used in the drive are designed not to drift and, therefore, do not require periodic recalibration in the field. This is unlike pneumatic actuators that use I/P transducers and positioners which eventually drift and require recalibration. In addition, Beck's Contactless Position Sensor (CPS) feedback device does not wear, unlike the feedback potentiometers used in most other actuators and positioners.

The mechanical design features of the Beck drive permit unparalleled low maintenance operation, even in the harshest environments. These features include a sealed motor and gearing that require no periodic lubrication.

Additionally, because the drive operates on 120 V ac power, all the problems associated with air systems are completely eliminated.

Retrofitting with Beck drives can result in immediate cost savings

Beck control drives can start improving product quality and process reliability immediately after installation, reducing waste and improving overall process efficiency. Beck Sales Engineers will assist you in selecting the models which are best suited to your needs. Beck will also help plan mounting locations, mounting hardware (if needed), and determine torque, timing, and signal connections. We can help you save time, simplify installation, and ensure the best performance at the lowest possible cost.

Contact Beck to find out more about how the efficiency, versatility, and durability of Beck drives can make a difference in your application.

GENERAL SPECIFICATIONS

Input Power	120 V ac single-phase 50 or 60 Hz 240 V ac single-phase 50 or 60 Hz
Operating Conditions	-40° to 185° F. (-40° to 85° C.) 0 to 99% relative humidity
Input Signal Options	4-20 mA or 1-5 V dc
Communication Interface Options	HART® protocol or local pushbutton/LED panel and RS-232 Serial Commands
Position Feedback Signal	4-20 mA
Action on Loss of Input Signal	Stays in place (all models) or moves to preset position (some models)
Action on Loss of Power	Stays in place

Note: Models approved for use in Hazardous classified locations are available—contact a Beck Sales or Application Engineer for details.



BECK[®] HAROLD BECK & SONS, INC.
2300 TERRY DRIVE • NEWTOWN, PENNSYLVANIA 18940 • USA
PHONE: 215-968-4600 • FAX: 215-860-6383
www.haroldbeck.com



IPB-PP
Rev. 02
Printed in USA
07/03